

## **Relationship model of Community Participation, Behavior and Waste Management Performance in Makassar Indonesia**

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**Abstract :** *The purpose of this research is to analyze the role of motivation factor of worker, community participation, community behavior and support of government policy toward performance of municipal waste management in Makassar City. This study used quantitative methods. Data collected from the respondents as a sample on the area of Makassar City as a research location with the distribution of questionnaires. The data obtained were analyzed using the statistic method approach of Structural Equation Modeling (SEM-PLS). Result was constructed by modeling the relationship of exogenous variables (X): Motivation Variables (X1) and Policy Variables (X2); while Endogen Variable (Y) consisted of Variable of Participation (Y1), Variable of Behavior (Y2) and Variable of Performance (Y3). The results showed that effective waste management was determined by work motivation and municipal waste policy through community participation. Work motivation and a good waste policy had a significant effect to the community participation. Activities in waste management involving community participation were shaped by willingness, solidarity, trust and sensitivity. Those all are considered as social capital for sustainable management. Community participation shaped community behavior through experience and equipment. Both of these were strongly influenced by educational and training factors.*

**Keywords :** *community behavior, community participation, government policy, waste management model, Makassar City*

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### **I. Introduction**

The issues of municipal waste in the world, especially cities in developing countries are widely discussed about characteristics, generation, collection, transportation, disposal, treatment technology adoption, and management institutional arrangement, appropriate technology, operational and financial management, and public awareness and participation. [1,2]. Generally, the population of developing countries is a major factor that adversely affects waste management functions. As the population increases, the amount of waste also increases, which in turn spends the landfill [3]. In Indonesia as a developing country, waste issues got of serious concerns. Waste productions are out of balance with human resources support, infrastructure, regulatory support and appropriate fund handling allocations [4]. Makassar is one of the big cities in Indonesia located in South Sulawesi which has problems of municipal waste management. Makassar is home of more than 1.7 million people that produce 600 to 800 tons of waste per day. This waste handling volume only reaches 60-70% per day or about 3,150 m<sup>3</sup> per day, and the remaining 1,350 m<sup>3</sup> per day of untreated waste [4]. Meanwhile, landfill capacity is decreasing to accommodate the waste volume from Makassar City [5]. Untreated wastes are widespread in the city and partly treated by burning, disposing to the river, and dumping in the soil.

There are several constraints of waste management including; (a) the perception of society that waste is the duty of the city government; (b) community participation is less focused and incidental, only at a certain time, and (c) there is no specific unit to carry out the preparation and implementation of extension activities, socialization, motivation and development of alternative models of waste management. Essential issues are not yet comprehensive policies and consistent in management and handling integrated waste. Actually, waste problem still considered unimportant problem compared with other issues. In addition, the lack of management support in the form of availability of, procedures, budgets, facilities and equipment. Even the number of sanitarians is sufficient; the waste management can not run well without clear division or task [6].

Based on the previous study, the waste disposal problems have increased and become complex in various aspects. The non-technical aspect covered several things including culture of society. Previous study showed that policy and worker motivation have had significant role in waste management. High motivation of workers is supported by community participation make changes in community behavior through the delivery

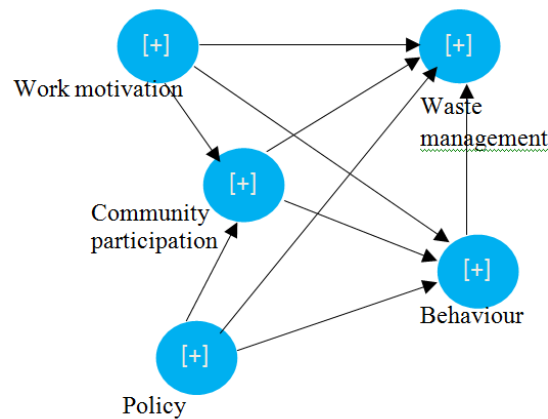
and implementation of policies. The role of waste manager to socialize to the community actively creates maximum work productivity. The purpose of the study is to analyze the role of motivation factor of workers, participation and community behavior as well as support of waste policy on the performance of urban waste management in Makassar

## II. Method

### Research Design

The data type of the research approach used in this study was a quantitative approach. As for the type of research approach is descriptive. Descriptive research is a research that intends to tell the solution of existing problems based on the data. The quantitative descriptive study used was intended to obtain information on the extent of non-technical aspects, including workers' motivation, community participation, community behavior, and waste management policies related to performance of waste service level in Makassar.

In accordance with the problems studied, in this study sampling was classified as survey research. Referring to the problem on the aspect of waste, in general, viewed from the aspect of the sample to be targeted, this research belongs to survey category. A survey study examines large and small populations by selecting and reviewing selected samples from the population to find the relative incidence, distribution and interrelation of social psychological variables. The type of this survey can be regarded as a sample survey. In this study, the researcher describes data on the existing research objects or variables of Makassar as the research area, including community participation variables, community behavior and performance on the urban waste management.



**Fig. 1.** Inter-Variable Concept Model

The figure of the conceptual framework model between the research variables above showed that in this study there were two exogenous variables, Workers Motivation (X1) and Waste Management Policies (X2), with three endogenous variables were the Participation (Y1), Behavior (Y2) and Waste Management Performance (Y3). In the model, it involves all indicator variables so that all variables are latent. In accordance with the above conceptual framework model, the data analysis technique used in this research was structural equation modeling (SEM), in which the independent variables were divided into a number of blocks arranged.

Data descriptive technique used descriptive statistical analysis. Data analysis used in this research was partial least square (PLS). The PLS has several advantages compared to other analytical tools: (1) it can analyze complex models, (2) the data did not need normally distributed, (3) it can use small samples and (4) it can handle the missing values.

This research was analyzed by using survey method data collection through questionnaires. Those consisted of questions about four variables measured by a number of indicators. Each respondent was asked to select a number from a scale of 1 to 5. Therefore, each construct needed to be tested for validity and reliability.

The final stage of the analysis in this research was hypothesis testing. The analytical tool used to test the hypothesis was Smart Partial Least Square (SmartPLS) software version 3.2.6. The reason of using Partial Least Square (PLS) was because of several research hypotheses that did not have a firm theoretical foundation yet.

### Research Location

The location of the research was in the area of Makassar of South Sulawesi Province, and focused on two districts, namely Makassar Sub-district and Biringkanaya Sub-district; the researchers focused on 14 urban villages of Makassar Sub-district and 7 urban villages of Biringkanaya Sub-district. This research activity started from the validation of research proposal and research permit from post graduate program, then got the

permission from the City Investment Coordinating Board or in Indonesia, to obtain the permission from the Mayor through the National Unity and Politics Board of Makassar for each sub-district to be delivered to each urban village which was all completely done between May until July 2017.

The research object was the performance of waste management including the first occurrence of waste up to the process of ranging from the source of the incidence of waste to the landfill. The subject of this study is the source of data asked for information in accordance with the research problem. To obtain the right data, it was necessary to determine the informants who have the competence or qualification and corresponding to the needs of the data (purposive). That was the citizens in general and the citizens in two districts that became the focus of the study, as well as the *Waste Management Departments (WMDs)* and *Health and Sanitation Departments*. This study describes how the community response as an object, viewed from the aspect of worker motivation, which was supported by the management policy factor by correlating with the performance of waste collectors

### III. Results And Discussion

#### Examination of Linearity Assumptions

Result linearity test showed that the correlation among the variables was linear. This test used to determine of linearity. The linearity assumption was only related to structural equation modeling. This means that the increase or decrease of variation in the criteria was followed consistently by the increase or decrease of variation on the criterion of the predictor, so that the correlation formed a straight or linear line.

The results explained that all paths meet linearity assumption ( $p < 0.05$ ). There was a supporting test result in the other part that is deviation from linearity which aimed to test whether the linearity fulfilled also supported by the poor fit model of non-linear relationships. This analysis concluded that the linearity requirements were fulfilled in all paths in the hypothetical model. In the result of linearity, the test result of F test was significant ( $p < 0.05$ ) (Table 1).

**Table 1.** Linearity Assumptions Test

Correlation	Linearity		Description
	F	p	
Work Motivation ==>Participation	204.765	0.000	Linier
Policy ==>Participation	264.975	0.000	Linier
Motivation ==>>Behavior	128.688	0.000	Linier
Policy ==>Behavior	152.856	0.000	Linier
Participation ==>Behavior	298.015	0.000	Linier
Work Motivation==>Management	162.883	0.000	Linier
Policy ==>Management	216.207	0.000	Linier
Participation ==>Management	273.556	0.000	Linier
Behavior ==>Management	190.428	0.000	Linier

#### Construct Validity and Reliability

Result showed that the model has convergent validity when outer loading values  $> 0.7$ , communality  $> 0.5$ , and average variance extracted (AVE)  $> 0.5$  [7]. All indicators were used in measuring latent constructs although their coefficients were tested insignificant with the provision of the absence of high multicollinearity problems (VIF  $> 5$ ) (Table 2).

The results of all coefficients work motivation showed positive relationships and some were tested insignificant ( $p > 0.05$ ). material (X1.1), willingness (X1.3), skill (X1.5) and education (X1.7), is a significant coefficient of work motivation indicator. The VIF values ranged from 1,166 to 2,182 indicate that it had have low multicollinearity problems.

The results of all coefficients of waste policy marked were positive and significant ( $p < 0.05$ ). the VIF values in the ranged of 1.123 - 1.605 indicate that the indicators had have low multicollinearity problems. Two large coefficients were in the waste volume reduction indicator (X2.1) and the scheduling (X2.4).

The results of all coefficients community participation were positive and result was not significant ( $p > 0.05$ ). Significant coefficients of indicators for community participation included willingness (Y1.1), sensitivity (Y1.2), self-confidence (Y1.4) and solidarity (Y1.6). The VIF values in the range of 1.422 - 1.940 explain that there was no any high multicollinearity problem among the indicators.

The latent variable of was measured formatively by 5 indicators. The results of all coefficients of community behavior were marked positive and most tested significant ( $p < 0.05$ ). Significant coefficients of the indicators for community behavior included culture (Y2.1), experience (Y2.3), social (Y2.4) and equipment (Y2.5). The VIF values in the range of 1.518 - 2.084 explain that it had have low multicollinearity problems. The two major coefficients were in the indicator of experience (Y2.3) and equipment (Y2.5).

The latent variable was measured formatively by 5 indicators. All coefficients of waste management were positive and most tested significant ( $p < 0.05$ ). Significant indicator coefficients on waste management

included technical (Y3.2), social (Y3.4) and environment (Y3.5). VIF values in the range of 1.196 - 1.989 explain that it had have low multicollinearity problems.. The greatest coefficient was in social indicator (Y3.4) that there was a positive social attitude by the citizens towards the waste collector, and doing the mutual assistance such as holding a clean-up activity in their environment weekly.

**Table 2** Loading Factor and VIF Value

Variable	Indicator	Outer Weight	VIF
Work Motivation	X1.1	0.263	1.805
	X1.2	0.197	1.721
	X1.3	0.234	2.023
	X1.4	0.083	2.182
	X1.5	0.223	1.896
	X1.6	0.097	1.393
	X1.7	0.297	1.166
Policy	X2.1	0.450	1.209
	X2.2	0.236	1.605
	X2.3	0.258	1.582
	X2.4	0.365	1.136
	X2.5	0.208	1.123
Community Participation	Y1.1	0.405	1.643
	Y1.2	0.183	1.795
	Y1.3	0.120	1.422
	Y1.4	0.188	1.886
	Y1.5	0.126	1.940
	Y1.6	0.292	1.666
Community Behavior	Y2.1	0.223	1.948
	Y2.2	0.134	1.891
	Y2.3	0.327	2.084
	Y2.4	0.257	1.935
	Y2.5	0.328	1.518
Waste Management Performance	Y3.1	0.161	1.541
	Y3.2	0.360	1.989
	Y3.3	0.111	1.538
	Y3.4	0.400	1.378
	Y3.5	0.381	1.196

**Structural Model Test (Inner Model)**

All of the three variables in the model have positive correlation coefficient each other with a range of 0.510 (behavior and motivation) to 0.664 (behavior and motivation). Correlation coefficient on the correlation among the variables was significant, because the critical value of correlation coefficient on the sample size of 350 was 0.105 (Table 3)

**Table 3.** Inter-variable Correlation

Construct	Motivation	Policy	Participation	Behavior	Management
Motivation	1.000				
Policy	0.655	1.000			
Participation	0.624	0.646	1.000		
Behavior	0.510	0.569	0.664	1.000	
Management	0.593	0.607	0.659	0.645	1.000

In the hypothetical model, it was added the mediation of community participation and behavior. Assessing the results of the test of the structural model (inner model) can be seen in the R-square (R<sup>2</sup>) on each endogenous constructs (community participation and behavior), coefficient value of path, t and p in each path relationship among the constructs. The value of path coefficient and t value on each path is explained in the sub-discussion of hypothesis testing result. The value of R<sup>2</sup> was used to measure the degree of variation in the variables described by a number of influencing variables [7]. The higher of R<sup>2</sup> means the better the predicted model of the proposed model.

In this hypothetical model, the results of the path coefficient test that passed through the community participation and behavior on waste management performance is interesting because it was strongly related to the assumption of the community participation and behavior that was as the mediation variables. The path coefficient on the direct correlation of work motivation and policy on waste management performance was decreased to 0.185 and 0.160. This could be explained since the contribution of waste management that came from community participation and behavior was stronger.

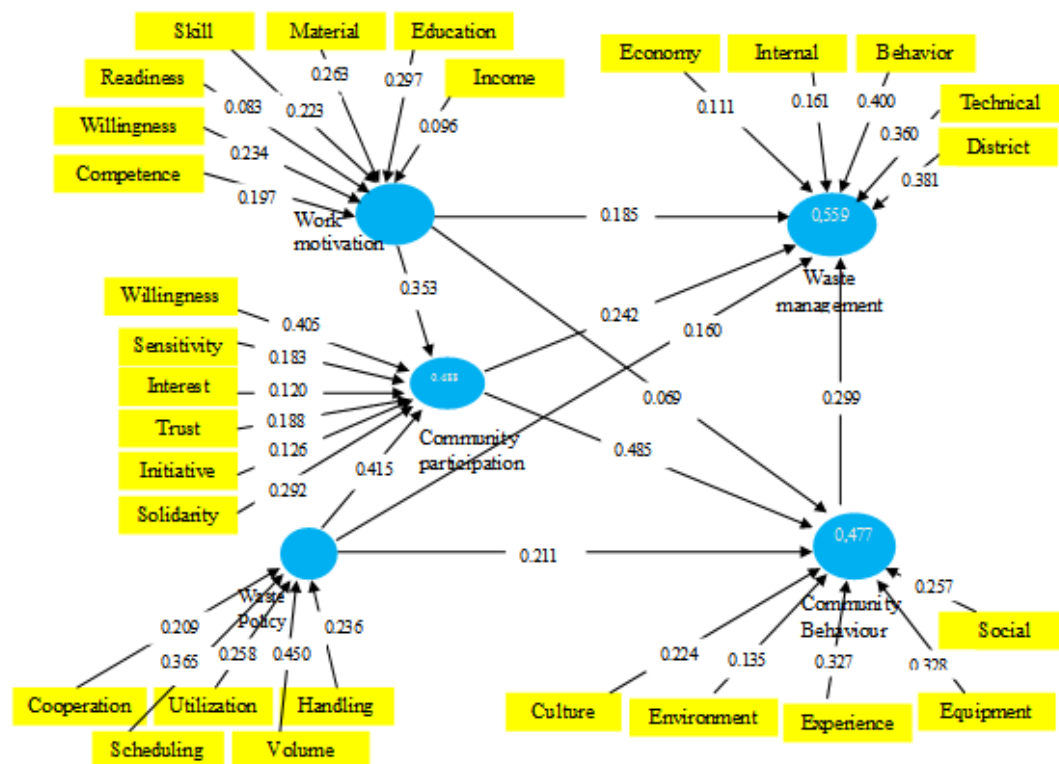


Fig 2. Hypothesis Model

The hypothesis model was calculated using SmartPLS version 3.2.6 to know the significance of path coefficient that is existed in the model or to know the significance of hypothesis supportability (Hartono and Abdillah, 2009; Ghozali, 2008). The path coefficient was significant if p was less than 0.05, the summary of the inner model results is described in Figure 2 and Table 4. The interpretation of the table and the figure explains the correlation among the variables as follows:

Work motivation on the community participation a positive directional coefficient. The results showed that the path coefficient of 0,353 with t-statistic of 6,211 (p <0,05) indicated that work motivation had a significant effect to the community participation. The high motivation of the work of the implementers increased the community participation.

Waste policies on community participation had a positive directional coefficient. The results showed that the path coefficient of 0.415 with t-statistics of 7.370 (p <0.05) indicated that the waste policy had a significant effect on the community participation. A good waste policy increased the community participation.

Work motivation on the community behavior had a positive directional coefficient. The results showed that the path coefficient of 0,069 with t-statistic of 0,821 (p > 0.05) indicated that work motivation did not have a significant influence to community behavior. Although, the motivation to work was better, but it could not directly explain the community behavior and vice versa.

Solid waste policies on community behavior had a positive directional coefficient. The results showed that the path coefficient of 0.211 with t-statistics of 2.689 ( $p < 0.05$ ) indicated that the waste policy had a significant effect on the behavior. A good waste policy would improve community behavior.

Community participation on community behavior had a positive directional coefficient. The results showed that the path coefficient of 0.485 with the t-statistics of 7.289 ( $p < 0.05$ ) indicated that participation had a significant effect on the behavior. Good participation would improve behavior.

Work motivation on waste management performance had a positive directional coefficient. The results showed that the path coefficient of 0.185 with t-statistic of 2.968 ( $p < 0.05$ ) indicated that work motivation had a significant effect on waste management. A good work motivation would improve waste management.

Waste management on waste policy had a positive directional coefficient. The results showed that the path coefficient of 0.160 with the t-statistic of 2.129 ( $p < 0.05$ ) indicated that the waste policy had a significant effect on the waste management performance. A solid waste policy would improve waste management.

Community participation on waste management performance had a positive directional coefficient. The results showed that the path coefficient of 0.242 with t-statistics of 3.040 ( $p < 0.05$ ) indicated that participation had a significant effect on waste management. Good participation would improve waste management.

Community behavior on waste management performance had a positive directional coefficient. The results showed that the path coefficient of 0.299 with t-statistics of 3.863 ( $p < 0.05$ ) indicated that the community behavior significantly influenced the performance of waste management. Good community behavior would improve waste management performance.

**Table 4.** The Results of Path Coefficient Testing on the Inner Model

Correlation	Path Coefficient	t-Statistic	P
Work Motivation ==>Participation	0.353	6.211	0.000
Policy ==>Participation	0.415	7.370	0.000
Motivation ==>>Behavior	0.069	0.821	0.412
Policy ==>Behavior	0.211	2.689	0.007
Participation ==>Behavior	0.485	7.289	0.000
Work Motivation==>Management	0.185	2.968	0.003
Policy ==>Management	0.160	2.129	0.033
Participation ==>Management	0.242	3.040	0.002
Behavior ==>Management	0.299	3.863	0.000

#### IV. Discussion

Our study showed that effective waste management was determined by work motivation and waste policy through community participation. Work motivation and a good waste policy had a significant effect to the community participation. Activities in waste management involving community participation were shaped by willingness, solidarity, trust and sensitivity. Those all are considered as social capital for sustainable management. Community participation shaped community behavior through experience and equipment. Both of these were strongly influenced by educational and training factors

Solid waste management has become an integral part of every society in various countries. The approach to SWM should be in accordance with the nature of particular communities, including Asian countries is no exception. In line with global trends, the system is on sustainability issues; playing through the incorporation of 3R technology (reduce, reuse and recycle). However, the degree and nature of improvements to sustainability vary and depends on the economic status of a country. Several factors may influence the system; these are government policy, government finance, waste characterization, settlement and segregation of waste, household education, household economy, administration, and land [8].

The public-community participation is the most commonly recommended method of managing problems in developing countries [9, 10]. One alternative solution is to keep the solid waste bank project. Several factors can affect achievement including knowledge and environmental attitudes [11], leadership, socio-economic, gender issues, and professionalism [12]. In some case, community participation was low, due to lack of knowledge, attitude, and action [13].

In Makassar City, several management scenarios have been investigated. From the scenario under test, a scenario that synergizes between waste management institutions and community participation is selected. It turns out that there are five community-based waste management stakeholders in Makassar, namely waste generating communities, waste management communities, pardons, environmentalists and the government [5].

#### V. Conclusion

Our study showed that effective waste management was determined by work motivation and waste policy through community participation. Work motivation and a good waste policy had a significant effect to the community participation. Activities in waste management involving community participation were shaped by willingness, solidarity, trust and sensitivity. Those all are considered as social capital for sustainable

management. Community participation shaped community behavior through experience and equipment. Both of these were strongly influenced by educational and training factors

It is recommended to the City Council or the Local Government especially in the city of Makassar must conduct a synergy between technical and non-technical aspects for waste management in the future. The technical aspect related to daily waste management productivity in the city, it is expected that there will be the preparedness aspect of facility, infrastructure and financing. Meanwhile, in the non-technical aspects, it includes the increase of workers motivation, participation and community behavior and also the support of waste policy to improve the waste management performance in the city of Makassar.

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